CLAIMS

The claims are as listed below with ~~strikethrough~~ and double brackets ([[ ]]) indicating the deletion of text from the claims and underline indicating the insertion of text into the claims.

1. (Currently Amended) A particle accelerator system, comprising:

an injector for emitting charged particles;

a bunching section having a plurality of bunching cavities therein, said bunching cavities being operable to receive charged particles from said injector and to bunch said received charged particles; and~~,~~

an accelerating section directly coupled to said bunching section, said accelerating section being operable to receive bunched charged particles from said bunching section and to accelerate said bunched charged particles, said accelerating section defining a port for receiving radio-frequency power;

wherein said port comprises a sole and only port of both of said accelerating section and said bunching section for receiving radio-frequency power.

2. (Original) The particle accelerator system of Claim 1, wherein said bunching section and said accelerating section are coupled for the communication of radio-frequency power from said accelerating section into said bunching section.

3. (Currently Amended) The particle accelerator system of Claim 1, wherein said bunching section and said accelerating section are connected by a passageway adapted to allow radio-frequency power to propagate from said accelerating section into said bunching section, and wherein said particle accelerator system has a longitudinal axis and said passageway is radially offset relative to said longitudinal axis.

4. (Currently Amended) The particle accelerator system of Claim 1, ~~wherein said accelerating section has a port, and~~ wherein said particle accelerator system further comprises a radio-frequency power source connected to said port, said radio-frequency power source being adapted to supply radio-frequency power to said accelerating section and to said bunching section through said port.

5. (Currently Amended) The particle accelerator system of Claim 4, wherein said accelerating section has an end at which a beam of accelerated charged particles is output, and wherein said accelerating section defines said port ~~at~~ proximate said end.

6. (Currently Amended) The particle accelerator system of Claim 1, wherein said bunching section and said accelerating section are adapted receive radio-frequency power from a single radio-frequency power source through said port.

7. (Original) The particle accelerator system of Claim 1, wherein said particle accelerator system further comprises a common wall extending between said bunching section and said accelerating section, said common wall defining a passageway extending therethrough between said bunching section and said accelerating section, said passageway being adapted to enable electromagnetic power to propagate from said accelerating section into said bunching section.

8. (Original) The particle accelerator system of Claim 7, wherein said passageway comprises a first passageway and said common wall defines a second passageway extending therethrough between said bunching section and said accelerating section, said second passageway being adapted to enable bunched charged particles from said bunching section to travel into said accelerating section.

9. (Currently Amended) The particle accelerator system of Claim 1, wherein said particle accelerator system further comprises a radio-frequency power source adapted to produce radio-

frequency power for delivery to both of said accelerating section and said bunching section, and wherein said accelerating section is communicatively interposed between said bunching section and said radio-frequency power source~~,~~ for the communication of ~~said accelerating section being operable to communicate~~ said radio-frequency power from said radio-frequency power source to said bunching section through said accelerating section.

10. (Original) The particle accelerator system of Claim 1, wherein each of said bunching cavities of said plurality of bunching cavities has a dimension extending in the primary direction of travel of said charged particles through said bunching section, and wherein said dimension of a first bunching cavity of said plurality of bunching cavities is greater than said dimension of a second bunching cavity of said plurality of bunching cavities, said second bunching cavity being positioned relative to said first bunching cavity in the primary direction of travel of said charged particles through said bunching section.

11. (Original) The particle accelerator system of Claim 1, wherein said bunching section has a first end and a second end, wherein said bunching cavities of said bunching section are axially aligned along an axis in a direction extending from said first end toward said second end, wherein each said bunching cavity has a dimension extending in said direction, and wherein said dimension of each said bunching cavity of said plurality of bunching cavities increases in magnitude for each said bunching cavity positioned successively in said direction.

12. (Currently Amended) A particle accelerator system, comprising:

an injector for emitting charged particles;

a bunching section operable to receive charged particles from said injector and to bunch said received charged particles;

an accelerating section operable to receive bunched charged particles from said bunching section and to accelerate said bunched charged particles; and~~,~~

a resonant coupling cavity interposed between said bunching section and said accelerating section.

13. (Currently Amended) The particle accelerator system of Claim 12, wherein said particle accelerator system further comprises a wall extending between said bunching section and said accelerating section, and wherein said wall defines said resonant coupling cavity therein.

14. (Currently Amended) The particle accelerator system of Claim 13, wherein said wall further defines a first passageway extending between said bunching section and said resonant coupling cavity, and wherein said wall further defines a second passageway extending between said accelerating section and said resonant coupling cavity.

15. (Currently Amended) The particle accelerator system of Claim 14, wherein said first passageway, said second passageway, and said resonant coupling cavity are adapted to enable radio-frequency power to propagate from said accelerating section to said bunching section.

16. (Currently Amended) The particle accelerator system of Claim 14, wherein said first passageway, said second passageway, and said resonant coupling cavity are adapted to enable charged particles to travel from said bunching section to said accelerating section.

17. (Currently Amended) The particle accelerator system of Claim 12, wherein said resonant coupling cavity is adapted to communicate radio-frequency power from said accelerating section into said bunching section.

18. (Canceled) The particle accelerator system of Claim 12, wherein said coupling cavity comprises a resonant coupling cavity.

19. (Original) The particle accelerator system of Claim 12, wherein said accelerating section has a port, and wherein said particle accelerator system further comprises a radio-frequency power source connected to said port, said radio-frequency power source being adapted to supply radio-frequency power to said accelerating section and to said bunching section through said port.

20. (Original) The particle accelerator system of Claim 12, wherein said bunching section and said accelerating section are adapted receive radio-frequency power from a single radio-frequency power source.

21. (Currently Amended) The particle accelerator system of Claim 12, wherein said particle accelerator system further comprises a radio-frequency power source adapted to produce radio-frequency power for delivery to both of said accelerating section and said bunching section, and wherein said accelerating section is communicatively interposed between said bunching section and said radio-frequency power source~~, said accelerating section being operable to communicate~~ for the communication of said radio-frequency power from said radio-frequency power source to said bunching section through said accelerating section.

22. (Original) The particle accelerator system of Claim 12, wherein said bunching section comprises a plurality of bunching cavities therein and has a first end and a second end, wherein said bunching cavities of said bunching section are axially aligned along an axis in a direction extending from said first end toward said second end, wherein each said bunching cavity has a dimension extending in said direction, and wherein said dimension of each said bunching cavity of said plurality of bunching cavities increases in magnitude for each said bunching cavity positioned successively in said direction.

23. (Original) The particle accelerator system of Claim 22, wherein said bunching section further comprises a plurality of coupling cavities therein, and wherein at least one of said

coupling cavities of said plurality of coupling cavities is interposed between successive bunching cavities of said plurality of bunching cavities.

24. (Original) The particle accelerator system of Claim 23, wherein said particle accelerator system defines a passageway extending between a bunching cavity of said plurality of bunching cavities and a coupling cavity of said plurality of coupling cavities.

25. (Original) The particle accelerator system of Claim 24, wherein said passageway is adapted to allow radio-frequency power to propagate between said bunching cavity and said coupling cavity.

26. (Original) The particle accelerator system of Claim 12, wherein said bunching section comprises a plurality of bunching cavities therein and a plurality of coupling cavities therein, and wherein at least one of said coupling cavities of said plurality of coupling cavities is interposed between successive bunching cavities of said plurality of bunching cavities.

27. (Original) The particle accelerator system of Claim 12, wherein said bunching section comprises a plurality of bunching cavities therein and a plurality of coupling cavities therein, and wherein at least one of said bunching cavities of said plurality of bunching cavities is interposed between successive coupling cavities of said plurality of coupling cavities.

28. (Original) The particle accelerator system of Claim 12, wherein said bunching section comprises a plurality of bunching cavities therein and at least one coupling cavity therein, and wherein said at least one coupling cavity is interposed between a first bunching cavity of said plurality of bunching cavities and a second bunching cavity of said plurality of bunching cavities.

29. (Original) The particle accelerator system of Claim 28, wherein said particle accelerator system defines a passageway extending between said at least one coupling cavity and said first bunching cavity of said plurality of bunching cavities.

30. (Original) The particle accelerator system of Claim 29, wherein said passageway is adapted to enable radio-frequency power to propagate between said at least one coupling cavity and said first bunching cavity of said plurality of bunching cavities.

31. (Original) The particle accelerator system of Claim 29, wherein said passageway is adapted to enable charged particles to travel between said at least one coupling cavity and said first bunching cavity of said plurality of bunching cavities.

32. (Currently Amended) A particle accelerator system, comprising:

an injector for emitting charged particles;

a bunching section having a first end and a second end and including a plurality of bunching cavities ~~therein~~ and at least one coupling cavity therein, said bunching cavities being axially aligned along an axis in a direction extending from said first end toward said second end, wherein each said bunching cavity has a dimension extending in said direction and said dimension of each said bunching cavity of said plurality of bunching cavities increases in magnitude for each said bunching cavity positioned successively in said direction, and wherein said bunching cavities ~~being~~ are operable to receive charged particles from said injector and to bunch said received charged particles; and;

an accelerating section directly coupled to said bunching section, said accelerating section being operable to receive bunched charged particles from said bunching section and to accelerate said bunched charged particles.

33. (Original) The particle accelerator system of Claim 32, wherein said bunching section and said accelerating section are coupled for the communication of radio-frequency power from said accelerating section into said bunching section.

34. (Original) The particle accelerator system of Claim 32, wherein said bunching section and said accelerating section are connected by a passageway adapted to allow radio-frequency power to propagate from said accelerating section into said bunching section.

35. (Original) The particle accelerator system of Claim 32, wherein said accelerating section has a port, and wherein said particle accelerator system further comprises a radio-frequency power source connected to said port, said radio-frequency power source being adapted to supply radio-frequency power to said accelerating section and to said bunching section through said port.

36. (Currently Amended) The particle accelerator system of Claim 32, wherein said bunching section and said accelerating section are adapted receive radio-frequency power from a single port connected to a single radio-frequency power source.

37. (Original) The particle accelerator system of Claim 32, wherein said bunching section and said accelerating section are connected by a passageway adapted to allow bunched charged particles to propagate from said bunching section into said accelerating section.

38. (Currently Amended) The particle accelerator system of Claim 32, wherein said particle accelerator system further comprises a radio-frequency power source adapted to produce radio-frequency power for delivery to both of said accelerating section and said bunching section, and wherein said accelerating section is communicatively interposed between said bunching section and said radio-frequency power source for the communication of~~, said accelerating section being~~

~~operable to communicate~~ said radio-frequency power from said radio-frequency power source to said bunching section through said accelerating section.

39. (Canceled) The particle accelerator system of Claim 32, wherein said bunching section has a first end and a second end, wherein said bunching cavities of said bunching section are axially aligned along an axis in a direction extending from said first end toward said second end, wherein each said bunching cavity has a dimension extending in said direction, and wherein said dimension of each said bunching cavity of said plurality of bunching cavities increases in magnitude for each said bunching cavity positioned successively in said direction.

40. (Original) The particle accelerator system of Claim 32, wherein said at least one coupling cavity is interposed between a first bunching cavity of said plurality of bunching cavities and a second bunching cavity of said plurality of bunching cavities.

41. (Original) The particle accelerator system of Claim 40, wherein said particle accelerator system defines a passageway extending between said at least one coupling cavity and said first bunching cavity of said plurality of bunching cavities.

42. (Original) The particle accelerator system of Claim 41, wherein said passageway is adapted to enable radio-frequency power to propagate between said at least one coupling cavity and said first bunching cavity of said plurality of bunching cavities.

43. (Original) The particle accelerator system of Claim 41, wherein said passageway is adapted to enable charged particles to travel between said at least one coupling cavity and said first bunching cavity of said plurality of bunching cavities.